numerals in the one-hundred series. As will be observed, this alternate embodiment of the present vibratory apparatus, designated **110**, is substantially similar in many respects to the previously-described embodiment. However, in this arrangement, a single drive belt **136** is provided for providing the desired driven interconnection of the counter-rotating drive shafts and eccentric weights, with the drive bent **136** in turn also trained about an associated drive motor **142**. As in the previously-described embodiment, it is contemplated that the drive belt **135** comprise a double-sided toothed belt, with one side of the toothed belt engaging and meshing with one of the toothed pulleys of one of the counter-rotating drive shafts, with the other side of the belt engaging and meshing with the other of the toothed pulleys of drive shafts.

As will be appreciated, the straightforward construction of the present vibratory apparatus facilitates desirably economical fabrication and maintenance. Configuration of the housing of the apparatus as a fabricated composite beam assembly configures the apparatus in a manner which combines the housing and mounting structures thereof. The absence of any one-to-one gear drives precludes the need for sealing the housing such as for containment of oil therein, thus obviating oil leaks or the like. External mounting of the bearings of the apparatus facilitates the required bearing maintenance without excessive disassembly of the apparatus, thus facilitating its economical use. Oil seals and like components typically required for gear-driven vibratory devices are desirably avoided. By use of the belt drive arrangement, shaft center distance between the counter-rotating drive shafts is flexible, and bearing alignment from side-to-side is not critical. The flexibility in shaft center distance allows the vibratory weight size to be selected as required, dependent upon the amount of unbalance (i.e., vibratory force) required to drive the associated conveying apparatus. Additionally, the provision of a separate belt drive for interconnection of the drive motor with one of the drive shafts permits the drive ratio to be easily changed by appropriate selection of the associated drive pulleys.

The illustrated embodiment includes vibratory weights configured for synchronous operation, with similar eccentricities of the vibratory weights providing a sinusoidal forcing function. The vibratory forces are perpendicular to the axes of shafts **22**, **24** and to a plane intersecting the axes of the shafts. However, other configurations can be employed in accordance with the principles disclosed herein. For example, the counter-rotating drive shafts can be intentionally configured to be driven out of phase, or provided with pulley configurations that cause the shafts to rotate at different speeds. Such drive configurations can be used to impart complex motion to a conveying bed for bulk material as it feeds on the conveying surface of a screen or conveyor. One example would be the provision of an exciter (vibratory weights) with the shafts aligned in the direction of material flow, and one shaft rotating twice as fast as the other one. This force combination would impart lateral force and a moment on the driven bed of the machine. Another alternate design would be with the shafts rotating at the same speed, but timed so that the forces from the two shafts add in a direction angular to the primary feed direction of the machine. A possible application for this configuration would be to increase the agitation of a bed of bulk material feeding on a screen to increase the efficiency of the screening action.

From the foregoing, it will be observed that numerous modifications and variations can be effected without departing from the true spirit and scope of the novel concept of the present invention. It is to be understood that no limitation with respect to the specific embodiments illustrated herein is intended or should be inferred. The disclosure is intended to cover by the appended claims all such modifications as fall within the scope of the claims.

What is claimed is:

1. A vibratory apparatus comprising:

a housing;

first and second counter-rotating drive shafts rotatably mounted on said housing in parallel relationship to each other;

first and second vibratory weights respectively eccentrically mounted on said first and second drive shafts said vibratory weights being mounted so that counter-rotation of said drive shafts causes said weights to create vibratory forces through said housing perpendicular to the axes of said drive shafts;

first and second drive pulleys respectively mounted on said shafts;

drive belt means interconnecting said first and second drive pulleys for synchronous counter-rotation of said first and second drive shafts;

drive motor means operatively connected with at least one of said drive shafts for effecting driven counter-rotation of said drive shafts and vibratory motion of said eccentrically mounted vibratory weights; and

a motor driven belt operatively connecting said drive motor means with said first drive shaft for effective driven rotation thereof, said drive belt means interconnecting said first and second drive shafts so that driven rotation of said first drive shaft effects driven rotation of said second drive shaft via said drive belt means, said motor driven belt separate from said drive belt means.

2. A vibratory apparatus, comprising:

a housing;

first and second counter-rotating drive shafts rotatably mounted on said housing in parallel relationship to each other;

first and second vibratory weights respectively eccentrically mounted on said first and second drive shafts, said vibratory weights being mounted so that counter-rotation of said drive shafts causes said weights to create vibratory forces through said housing perpendicular to the axes of said drive shafts;

first and second drive pulleys respectively mounted on said shafts;

drive belt means interconnecting said first and second drive pulleys for synchronous counter-rotation of said first and second drive shafts;

drive motor means operatively connected with at least one of said drive shafts for effecting driven counter-rotation of said drive shafts and vibratory motion of said eccentrically mounted vibratory weights; and

first and second pairs of bearings for respectively rotatably mounting said first and second drive shafts on said housing, each pair of said bearings being mounted on an exterior surface of said housing to facilitate maintenance of said bearings.

3. A vibratory apparatus in accordance with claim **2**, wherein said drive belt means comprises a single drive belt operatively interconnecting said drive motor means with said first and second drive shafts.

4. A vibratory apparatus in accordance with claim **2**, wherein

said first and second drive pulleys respectively comprise toothed drive pulley mounted on said first and second